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Transdiagnostic approach to the dominance behavioral system

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ABSTRACT

Introduction: The dominance behavioral system (DBS) is a biologically-based multi-faceted system guiding motivation, behavior, self-perceptions, and responsivity to social experiences related to dominance. Evidence has indicated that DBS facets differentially relate to specific psychopathologies. In the present research, we attempt to replicate Tang-Smith et al. (2015) and extended findings by including antisocial behavior, social anxiety, and psychopathy.

Methods: Participants ($N = 712$) completed measures assessing antisocial, socially anxious, depressive, manic, and psychopathic tendencies, along with dominance-relevant dimensions.

Results: Using multi-group structural equation modelling, antisocial behavior, social anxiety, and depression overlapped with lower Influence/Power and Authentic Pride. Social Anxiety was uniquely related to lower Comfort with Leadership. Antisocial behavior, mania, and psychopathy overlapped with greater Comfort with Leadership and Ruthlessness, and antisocial behavior and mania with greater Hubris. Antisocial behavior was uniquely related to lower Cooperation. These findings were consistent across genders.

Discussion: The present research replicates and extends findings that internalizing and externalizing psychopathologies have unique DBS profiles. Implications and limitations are discussed.

1. Introduction

Evidence for the importance of the dominance behavioral system (DBS) across psychopathologies has accrued from social, psychological, and biological paradigms using self-report, observational, naturalistic and experimental methods (Johnson et al., 2012). The DBS is a biologically-based system influencing dominance motivation, dominant and subordinate behavior, self-perceptions of power, and power-related social experience responsivity (Johnson et al., 2012). Ability to express and respond to social dominance cues appropriately is evolutionarily adaptive: human and animal research indicates that dominance structures can promote effective group management of resources, while successful signaling of dominant-subordinate rank cues can reduce conflict (Gilbert, 2000; Kelly et al., 2011). Conspecific groups benefit from the guidance of a highly ranked organism, in which dominant individuals possess resources, including those that promote reproductive success (Fournier et al., 2002; Van Vugt et al., 2008).

The DBS encompasses multiple facets. Power reflects the ability to control resources in group settings (Keltner et al., 2003). People vary in their motivations and preference for trait-like power tendencies. Strategies toward attaining power also vary: some use cooperation, others engage in ruthless behaviors, prioritizing power-pursuit over connectedness (Fournier et al., 2002). Power and dominance motivation are situation-specific; higher level organisms have evolved to be highly sensitive to cues regarding rank and power. Subordination refers to environmental experiences indicating lower rank or power. Submissive behaviors signal awareness of lower power and are effective in reducing conflict (Gilbert & Allan, 1994). Emotions are often triggered by power cues: pride reflects having attained accomplishments garnering interpersonal recognition and higher rank, while shame is triggered by acknowledgement that one's behavior lead to diminished status and interpersonal recognition (Gilbert, 1998). Authentic pride (adaptive achievement-oriented pride) has been tied to more prosocial behavior, whereas hubristic pride (maladaptive grandiose self-pride) is related to prioritizing getting ahead particularly at the cost of others (Dorfman et al., 2014; Wubben et al., 2012). Although the DBS dimensions are integrally related, pathologies could reflect disturbances in more specific processes.

Multiple facets of the DBS correlate differentially with specific psychopathologies. Extensive theory has linked internalizing conditions

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(anxiety and depression) with prolonged responses to subordination and submissive behavior (Gilbert, 2000; Sloman et al., 2003). For instance, subordination experiences, shame, and behavioral submissiveness are more related to depressive symptoms than guilt or sadness (Gilbert et al., 2009; Harder & Zalma, 1990), while they also consistently correlate with social anxiety (Sturman, 2011; Walters & Inderbitzen, 1998). Theory further suggests that social anxiety reflects an oversensitivity to dominance cues and social comparison (Trower & Gilbert, 1989). On the other hand, manic symptoms may reflect a biological sensitivity to self-perceptions of attained power, particularly given that cardinal symptoms (i.e., grandiosity, rapid speech) correlate to heightened dominance motivation (Gardner, 1982; Taylor & Mansell, 2008). Animal research indicates dominant behaviors are quelled by one of the more commonly used pharmacological treatments for mania—lithium (Malatynska & Knapp, 2005).

Psychopathy, as well as antisocial behavior—differentiated by the focus on rule-breaking, impulsive and aggressive behaviors—theoretically relate to a focus on pursuit of dominance (Glenn et al., 2011). Psychopathy, particularly the facet fearless dominance, is positively correlated with dominance motivation, and to a lesser degree, dominance behaviors (Lobbestael et al., 2018; Patrick et al., 2006). Antisocial behavior and psychopathy both relate to greater reactivity (i.e., heightened anger or aggression) in response to rank or power threats (e.g., disrespect and commands; Cale & Lilienfeld, 2006; Costello & Dunaway, 2003). Although less empirical work is available on antisocial behavior, the childhood precursor, conduct disorder, correlates with dominance behaviors (Krueger et al., 1996).

Despite evidence that dominance may be involved in multiple psychopathologies, there are gaps. Methods to assess dominance have varied systematically across psychopathologies, and few studies have used measures differentiating dominance motivation, behaviors, self-perceptions, and emotional outcomes. Work by Tang-Smith et al. (2015) attempted to bridge this gap by assessing six factor-analytically supported dominance-related dimensions. Consistent with theory, structural equation modelling indicated mania was uniquely related to higher self-perceived power, pride, and motivation to attain power; in contrast, depression and generalized anxiety were both tied to lower subjective power and pride. Here, we test the theory that specific facets of DBS will be linked to specific psychopathologies, even when conjointly controlling for overlap and comorbidity among the various psychopathologies.

1.1. Present research

The goal of the current study was to examine how a broad range of psychopathology tendencies relate to multiple dimensions of DBS. Following Tang-Smith et al. (2015), we focused on mood syndromes but we extend this work by (1) focusing on social anxiety rather than general anxiety and (2) assessing antisocial behavior and psychopathic tendencies. We hypothesized that mood syndromes would show unique dominance profiles, paralleling Tang-Smith study findings. Specifically, we predicted that social anxiety and depression would be associated with lower perceived power and authentic pride, whereas mania would be associated with higher power, authentic pride, hubris, and dominance motivation. We further hypothesized that antisocial behavior and psychopathic tendencies would relate to more hubris and ruthlessness and less authentic pride and cooperation.

2. Method

Procedures were approved by the university ethics board before data collection began.

2.1. Participants

Participants (N = 752) were undergraduate students age 18 and older at a large public North American university. Data was gathered in two waves. After consent procedures, participants completed online questionnaires and received partial course credit for their undergraduate psychology courses. Thirty-eight participants were excluded for failure to respond correctly to more than 50% of attention catch items (e.g., "Please answer 'Strongly agree.'"), and two participants did not complete most questionnaires. Participants in the final sample ($N = 712$; 65.7% female; $M_{age} = 20.7$, $SD_{age} = 3.04$; $M_{SES(out\ of\ 9)} = 6$, $SD_{SES} = 1.74$) described their ethnicities: African American (1.8%), Asian (45.2%), Caucasian (20.8%), Hispanic (13.9%), Middle Eastern (2.8%), and Other (2.1%).

2.2. Measures

Unless noted, all total and subscale scores reflect the sum of item scores.

2.2.1. Dominance

Dominance-related dimensions were measured using the factor-analytically derived *Dominance Behavioral System scale* (Tang-Smith et al., 2015). The six DBS subscales includes items from multiple well-validated dominance scales: Influence/Power (4-items; Anderson et al., 2012), Comfort with Leadership (4 reverse-keyed items; Jackson, 1984), Authentic and Hubristic Pride (6- and 7-items; Tracy & Robins, 2007), and Cooperation and Ruthless Ambition (4- and 3-items; Zuroff et al., 2010). Response formats were consistent with original scales, 1 = *false* to 4 = *true* for Authentic and Hubristic Pride, and Comfort with Leadership, 1 = *disagree* to 4 = *agree* for Influence/Power, and 1 = *unlike me* to 4 = *like me* for Cooperation and Ruthless Ambition.

2.2.2. Antisocial behavior

Antisocial behavior was measured using the *Subtypes of Antisocial Behavior Questionnaire* (STAB; Burt & Donnellan, 2009), which includes three factor-analytically derived subscales: Physical Aggression (9-items), Social Aggression (11-items), and Rule-breaking (11-items). STAB subscales differentiate normative populations from people engaging in criminal behaviors or substance misuse, as well as general acting-out behaviors (Burt & Donnellan, 2009). Responses were rated on a scale from 1 = *never* to 5 = *nearly all the time*.

2.2.3. Social anxiety

Social anxiety tendencies were measured using the *Fear of Negative Evaluation Scale* (FNE), the *Liebowitz Social Anxiety Scale* (LSAS), and the *Social Interaction Anxiety Scale* (SIAS). The 30-item FNE (Watson & Friend, 1969) true/false scale is designed to measure fear of receiving negative evaluation from others, and has been validated against self-rated discomfort in tasks involving evaluation, and against social approval-seeking and interaction-anxiety scales (Leary, 1983).

The LSAS (Liebowitz, 1987) is designed to assess fear and avoidance in 24 situations that often trigger social anxiety: social interactions (11-items) and public performance (13-items). The LSAS has good psychometric properties (Baker, Heinrichs, Kim, & Hofmann, 2002). For each situation, participants first rated anxiety or fear from 0 = *none* to 3 = *severe*, then their frequency of avoidance from 0 = *never* to 3 = *usually*. For situations participants did not ordinarily experience, they rated their response in an imagined or hypothetical situation.

The 20-item SIAS (Mattick & Clarke, 1998) is designed to assess fear of social interaction. It shows adequate internal consistency and expected relationships with measures of associated constructs (Brown et al., 1997). Scores distinguish those with social anxiety from other anxiety disorders (Le Blanc et al., 2014). Items were rated on a scale from 0 = *not at all characteristic or true of me* to 4 = *extremely characteristic or true of me*.

2.2.4. Depression

Depressive tendencies were measured using the *Inventory to Diagnose*

Depression-Lifetime (IDD-L) and *7-Up 7-Down-Depression subscale* (7U7D). The IDD-L (Zimmerman & Coryell, 1987) is assesses lifetime depressive severity. The 22-items cover the nine key symptoms of major depressive disorder included in DSM-5 criteria (e.g., guilt, hopelessness, decreased energy, and suicidality). The IDD-L correlates robustly with self-report and interview-based measures of depressive symptom severity (Hodgins, Dufour, & Armstrong, 2000). Each item is rated from not present (e.g., 0= '*My appetite was not greater than normal*') to severe (e.g., 4= '*I felt hungry all the time*'). For each item endorsed at 2 or higher, participants indicated if the symptom was present for at least two weeks. The total IDD-L score is a sum of the number of symptoms endorsed with sufficient severity for at least 2 weeks (range 0–9).

The 7U7D (Youngstrom et al., 2013) is designed to measure lifetime tendencies to experience manic and depressive symptoms (7-items each). The scale has construct and discriminative validity (Youngstrom et al., 2013). Items were extracted from the well-validated General Behavior Inventory (Depue et al., 1987) based on factor analysis and robust correlations with key indicators of bipolar disorder. Responses were rated on a scale from 1 = *never or hardly ever* to 4 = *very often or almost constantly*.

2.2.5. Mania

Manic tendencies were assessed using the *Hypomanic Personality Scale* (HPS) and the *7-Up 7-Down-Mania subscale*. The HPS (Eckblad & Chapman, 1986) is designed to identify people at risk for bipolar disorders. Forty-eight items assess tendencies toward high-energy, and changes in energy, emotions, and behaviors. Initial validation found that 78% of people scoring higher than two standard deviations above the mean met diagnostic criteria for bipolar disorder; 75% developed hypomanic or manic episodes 13-years later (Kwapil et al., 2000). Responses were rated from 0 = *strongly disagree* to 3 = *strongly agree*.

The 7U7D-Mania subscale assesses lifetime manic tendencies (e.g., 'Have you had periods of extreme happiness and intense energy'). Responses were rated from 1 = *never or hardly ever* to 4 = *very often or almost constantly*.

2.2.6. Psychopathy

Psychopathy was measured using the *Psychopathic Personality Inventory-Short Form* (PPI-SF; Lilienfeld & Hess, 2001). The PPI-SF assesses the core features of psychopathy in non-institutionalized settings. Half of items are reverse keyed. As noted, we focused on factor-analytically derived Fearless Dominance subscale (7-items), because of its strong relation to dominance motivation. Responses were rated from 1 = *false* to 4 = *true* (range 7 to 28).

2.3. Data analysis

Data were analyzed using IBM SPSS version 25 and AMOS for structural equation modelling (SEM; e.g., Kline, 2005), with two-tailed analyses, alpha = 0.05. Collection wave was included as a covariate in modelling. Factor analysis and latent factors were assessed for Antisocial Behavior, Social Anxiety, Depression, Mania, and Psychopathy before constructing the full SEM model. Missing data patterns appeared to be random, and accordingly, to address missingness across key model variables, the data was imputed for variables included in SEM modelling. SEM was used to test the simultaneous unique relationships between DBS scales and latent psychopathology factors using full maximum likelihood. As indicators of moderate to good model fit, we inspected the Comparative Fit Index (CFI) using a cut-off value of >0.90 (Hu & Bentler, 1999) and the root mean square error of approximation (RMSEA) using cut-off range of <0.05–0.08 (Browne & Cudeck, 1992). We focus on these fit indices because of stability or improvement with more variables, following recommendations for SEM reporting (Bentler, 2007). Given the number of model parameters, other fit indices (i.e., NFI, TLI) either were not appropriate for model comparison, or added penalty for each parameter (Hu & Bentler, 1999; Kenny & McCoach, 2003).

Table 1
Descriptive statistics by gender and internal consistencies for key variables (N = 712).

Measures	α	*Men* (n = 175)	*Women* (n = 468)	t
		M (*SD*)	*M* (*SD*)	
Dominance Behavior System				
Influence/Power	0.77	14.40 (2.86)	14.51 (2.93)	−0.42
Comfort with leadership	0.86	22.80 (4.53)	21.61 (4.89)	2.80**
Authentic pride	0.91	20.61 (4.64)	20.88 (4.42)	−0.67
Hubristic pride	0.90	11.28 (4.09)	10.27 (3.72)	2.85**
Cooperation	0.84	20.66 (2.95)	21.19 (2.82)	−2.10*
Ruthless ambition	0.75	6.68 (2.25)	5.96 (2.07)	3.81**
Subtypes of Antisocial Behavior				
Physical aggression	0.85	17.14 (5.71)	14.80 (4.64)	4.76**
Rule-breaking	0.85	14.82 (6.01)	12.88 (3.71)	3.93**
Social aggression	0.88	21.52 (6.46)	20.94 (6.02)	1.05
FNE	0.92	46.06 (8.41)	48.75 (7.50)	−3.68**
LSAS	0.88	39.54 (21.83)	47.01 (22.02)	−3.83**
SIAS	0.93	29.54 (14.39)	30.78 (15.00)	−0.93
IDD-L	0.86	2.59 (2.58)	2.77 (2.93)	−0.78
7U7D-depression	0.93	13.36 (5.14)	13.59 (5.21)	−0.50
HPS	0.91	62.46 (16.85)	59.23 (17.22)	2.09*
7U7D-mania	0.87	12.57 (4.48)	11.44 (4.08)	2.87**
PPI-SF-fearless dominance	0.77	17.11 (4.07)	15.41 (4.53)	4.51**

Note. FNE = Fear of Negative Evaluation Scale; HPS = Hypomanic Personality Scale; IDD = Inventory to Diagnose Depression; LSAS = Liebowitz Social Anxiety Scale; PPI-SF = Psychopathic Personality Inventory-Short Form; SIAS = Social Interaction Anxiety Scale; 7U7D = 7-Up 7-Down.
Descriptive data from unimputed dataset.
Participants missing data: 2 for Comfort with Leadership, 1 for Authentic/Hubristic Pride, 45 for STAB, 28 for FNE, 16 for LSAS, 26 for SIAS, 19 for IDD-L, 52 for 7U7D-Depression, 44 for HPS, 52 for 7U7D-Mania, 65 for gender, and 87 for PPI-SF.
* $p \leq .05$.
** $p \leq .01$.

3. Results

Table 1 shows descriptive and internal consistency statistics. To account for gender differences on several scales, final structural modelling used multi-group analyses. Due to technical error during data collection, gender was missing for 65 participants. Distributions were in normal range (skewness<3, kurtosis<10; Kline, 2005), except STAB Rule-breaking (eleven values were identified to be greater than 3 *SD* above the mean but exclusion did alter results, thus no transformations were included in final analyses).

3.1. Structural equation modelling

Preliminary analyses showed DBS scales were significantly correlated with psychopathology scales (Table S2). After confirming latent psychopathology factors (see Supplementary materials), we constructed a full multi-group model to test unique relationships of DBS with psychopathology, controlling for sample. When comparing models (structural-weights–unconstrained), gender was not comparable on two paths: covariances of Sample with Cooperation and Ruthless Ambition. When these two paths were set to equal, the full models were comparable, demonstrating moderate fit ($CFI_{unconstrained}$ = 0.870, $RMSEA_{unconstrained}$ = 0.05; Structural-weights: $\chi 2(df = 454) = 1291.10$, $p < .001$, CFI = 0.846, RMSEA = 0.051; Covariances-equal: $\chi 2(df = 392) = 1094.9$, $p < .001$, CFI = 0.870, RMSEA = 0.05). Across genders, several significant unique associations between DBS scales and psychopathology factors

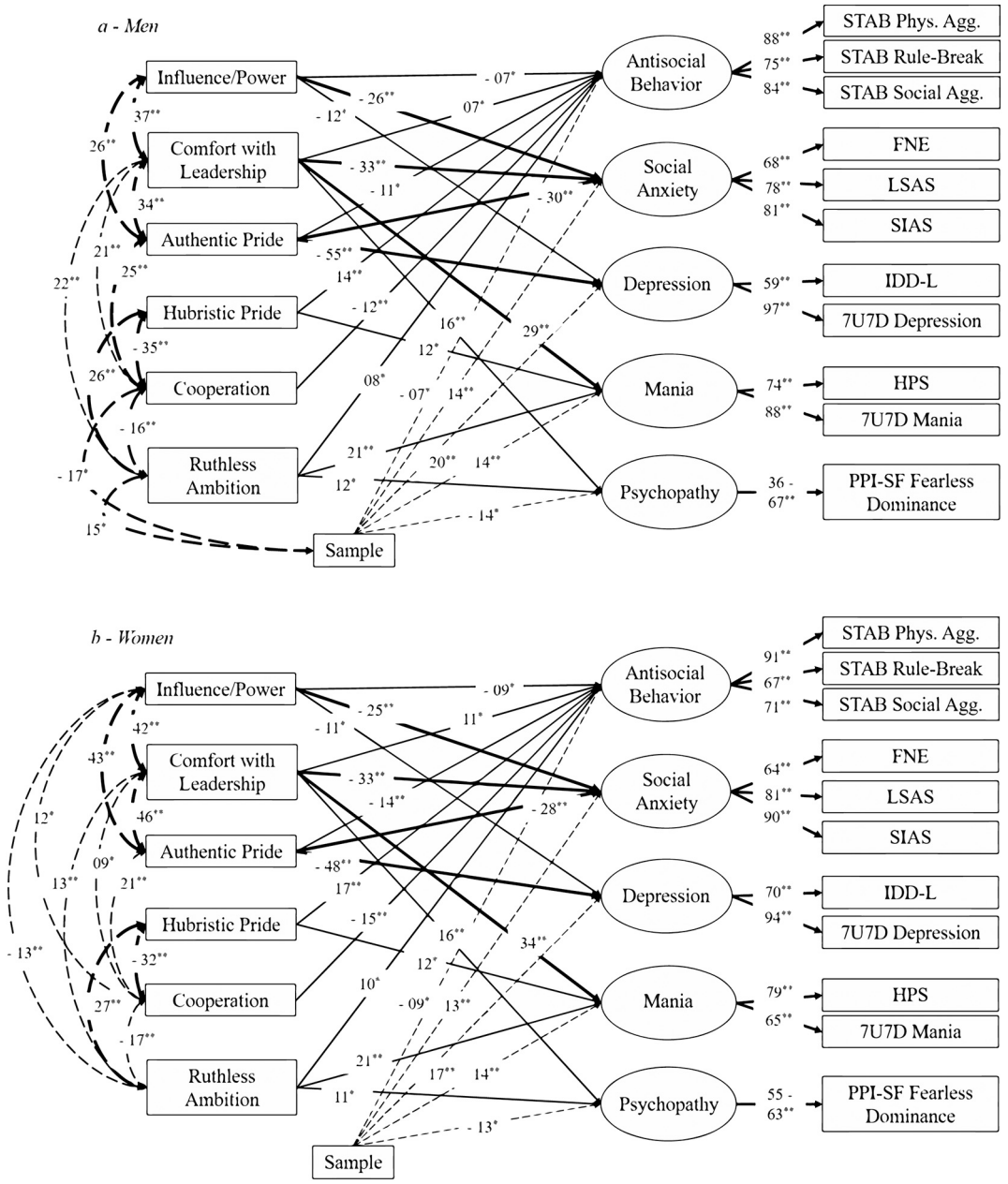

Fig. 1. Multi-group (men, Fig. 1a; women, Fig. 1b) structural equation modelling of DBS with psychopathology latent factors. Sample set to equal for paths to Cooperation and Ruthless Ambition to make models comparable. Standardized regression coefficients (*B*) shown. Only significant associations from structural-weights model ($ps \leq .05$) pictured, thicker lines $B > 0.25$ and dashed lines for covariances and sample. FNE = Fear of Negative Evaluation Scale; HPS = Hypomanic Personality Scale; IDD = Inventory to Diagnose Depression; LSAS = Liebowitz Social Anxiety Scale; PPI-SF = Psychopathic Personality Inventory-Short Form; SIAS = Social Interaction Anxiety Scale; STAB = Subtypes of Antisocial Behavior Questionnaire; 7U7D = 7-Up 7-Down.
$^{*}p \leq .05$. $^{**}p \leq .01$.

were observed (Fig. 1). Antisocial Behavior, Social Anxiety, and Depression each had negative associations with Influence/Power and Authentic Pride. Social Anxiety negatively associated with Comfort with Leadership. Antisocial Behavior and Mania positively associated with Hubristic Pride. Antisocial Behavior, Mania, and Psychopathy positively associated to Comfort with Leadership and Ruthless Ambition. Antisocial Behavior uniquely negatively related to Cooperation. Sample significantly predicted each psychopathology.

4. Discussion

The goal of this study was to consider how specific dominance factors relate to various psychopathologies. We aimed to replicate findings of unique mood syndrome-DBS profiles (Tang-Smith et al., 2015). We extended findings by assessing social anxiety rather than general anxiety and antisocial behavior and psychopathy as they relate to DBS.

We found strong evidence of the importance of a multi-dimensional approach to understanding DBS in psychopathology. Significant bivariate effects of dominance-related dimensions were observed with psychopathology, with some large effect sizes (*r*'s > 0.40). In structural modelling, distinct psychopathology-dominance profiles emerged, with small-medium effect sizes. Socially anxious and depressive tendencies and antisocial behavior associated with lower Influence/Power and Authentic Pride. Antisocial behavior, manic and psychopathic tendencies were each tied to greater Comfort with Leadership and Ruthless Ambition. Antisocial behavior and manic tendencies related to greater

Hubristic Pride. Beyond that, unique profiles discriminated some of the syndromes. Specifically, social anxiety uniquely related to lower Comfort with Leadership and antisocial behavior uniquely related to lower Cooperation. The effects of DBS in relation to psychopathology were confirmed across genders.

Findings extend previous work, suggesting that social anxiety and depression are tied to a diminished sense of power, less pride in one's accomplishments, and for social anxiety, lower desire to be in roles of power. Together with longitudinal and biological research (see Johnson et al., 2012), this work extends a growing body of evidence of DBS as an important risk for internalizing disorders, and it bolsters previous findings by showing these effects are sustained when controlling for a broad range of other conditions. The social anxiety profile is novel and distinct from findings pertaining to general anxiety (Tang-Smith et al., 2015), highlighting the importance of specificity with broad categories like anxiety.

At the same time, this work provides novel evidence about the overlapping and unique effects of DBS profiles in externalizing disorders (antisocial behavior, manic and psychopathic tendencies). Consistent with previous research, we found that mania and psychopathy related to greater desire for dominance (Taylor & Mansell, 2008; Tellegen & Waller, 2008), via Comfort with Leadership scale, and this effect extended to antisocial behavior. Previous findings showed manic tendencies were related to greater hubris and ruthless power attainment; current findings support and extend this by showing ruthlessness also relates to antisocial and psychopathic tendencies.

Some psychopathology–dominance profiles did not replicate. Unlike Tang-Smith et al. (2015), we did not find depression related to lower hubris in either bivariate correlations or SEM model. We did not observe significant effects of Authentic Pride with mania in the SEM model, despite a small significant bivariate correlation, suggesting some shared variance with antisocial behavior and psychopathy accounted for these effects.

We note several limitations within this research. First, we relied on self-report indices in a student sample. It will be important to replicate these findings across diverse age groups, with diagnostic measures, and patient samples. However, recent work suggests that prevalence of psychopathology in undergraduate samples is similar to rates observed in the general population (Hunt & Eisenberg, 2010; Ibrahim et al., 2013), and the psychopathologies assessed here operate as continua. Second, our design was cross-sectional. Third, our measures did not capture functional impairment and well-being, which may predict and result from dominance-related dimensions (e.g., effects of symptoms may diminish accomplishment, explaining lowered authentic pride in those with anxiety; Weidman et al., 2016). Finally, future studies would benefit from inclusion of hormone measures.

4.1. Conclusions

Most previous studies limited focus on only one or two facets of the DBS, and failed to consider the unique effects compared to other syndromes. By replicating and expanding the first multivariate approach to understanding DBS in relation to multiple psychopathologies, this research provides further evidence that the DBS has separable facets, each with unique profiles corresponding to internalizing and externalizing psychopathologies. The current study is unique in considering how these effects persist against a broad range of other psychopathologies, and with attention to a set of dimensions. This provides a much more specific set of findings about which facets of the DBS most clearly link with social anxiety and antisocial behaviors in particular.

Many psychopathologies appear to be tied to a sense of powerlessness and lack of authentic pride, highlighting the importance of restoring key domains of life that provide a sense of power and accomplishment. Social anxiety appears tied to a discomfort in leadership and power, which may interfere with success and specific social and occupational roles. In contrast, externalizing syndromes (antisocial behavior, psychopathy, and mania) were tied to a desire for dominance without regard to interpersonal consequences; greater insight and awareness regarding this priority and its implications could help reduce interpersonal conflicts. Promoting prosocial strategies could perhaps help transform antisocial and psychopathic drives for power into more successful, adaptive pursuit of leadership (Costello et al., 2018; Hawley, 2015).

Clinically, these findings may further help build therapeutic rapport and understanding of how specific psychopathologies tie to motivations and concerns in interpersonal relationships. This is critical for the core therapeutic goal of building more meaningful and grounded interpersonal functioning. Practitioners may find it helpful to consider that the pursuit of power and sensitivity to hierarchy are evolved strategies associated with genuine rewards (Hawley, 2015). If the DBS field is to inform treatment research, we need to understand what the most potent forms of DBS are, and how those are tied to more specific symptom dimensions. The current study provides that grounding.

CRediT authorship contribution statement

Conception and design of study: J.A.T. & S.L.J; acquisition of data: J.A.T. & A.D; analysis and/or interpretation of data: J.A.T. & S.L.J. Drafting and revising the manuscript: J.A.T., S.L.J, & A.D. All authors approved manuscript.

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Declaration of competing interest

The authors have no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2021.110778.

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